



**North Carolina Department of Transportation
Phase II Investigation
State Project: R-5709
WBS Element: 50205.1.1
Moore County**

**Parcel 79
Robert L. Schloegl Property
9820 NC 211 Hwy
Aberdeen, North Carolina
October 21, 2021**

**Wood Environment & Infrastructure Solutions, Inc.
Project: 20478R5709**

Andrew Frantz, REM
Senior Scientist

Helen Corley, LG, BCES
Principal Hydrogeologist

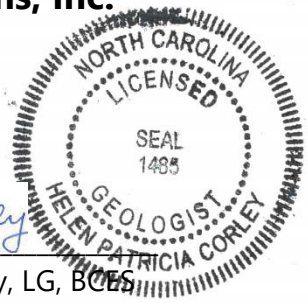


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1.0 INTRODUCTION

In response to the North Carolina Department of Transportation (NCDOT) Request for Proposal, dated June 2, 2021, Wood Environment & Infrastructure Solutions, Inc. (Wood) has performed a Phase II Investigation for Parcel 79 (Site). The investigation was conducted in accordance with Wood’s Technical and Cost proposal dated June 18, 2021, and NCDOT’s July 6, 2021, Notice to Proceed. NCDOT contracted Wood to perform the Phase II Investigation at the parcel, which will be affected by proposed widening of NC 211 Hwy from US 15-501 in Aberdeen, North Carolina to SR 1244 (West Palmer Street)/SR 1311 (Mockingbird Hill Road) in Raeford, North Carolina.

The Site is located in the eastern quadrant of the intersection of NC 211 Hwy and Pleasant Street, as shown on the Vicinity Map, **Figure 1**. The parcel, which is located at 9820 NC 211 Hwy, is currently occupied by a vacant dilapidated building. The Site is identified as Parcel 79, Robert L. Schloegl property, within the NCDOT MicroStation survey file and is in Aberdeen of Moore County, North Carolina. The area of investigation at Parcel 79 encompasses the entire 0.236-acre parcel as shown on **Figure 2**.

The Site was reported as a possible former gasoline station in the 2019 NCDOT Phase I Report. In addition, a concrete pad was observed along the northern exterior of the vacant building. Two metal pipes were observed protruding up from the concrete pad. Based on the location of the concrete pad and the presence of the metal pipes, it is suspected the pad is a former dispenser island. Wood reviewed the North Carolina Laserfiche online database and NCDEQ documentation for Parcel 79 was not present. In addition, Wood reviewed the NCDOT Historical Aerial Imagery Index and a photograph from 1990 was available for review. The current Site building was visible on the photograph. Due to the quality of the aerial photograph, other Site features were not discernable.

The following report describes a geophysical survey and subsurface field drilling and sampling investigation at the Site, with results from our ultraviolet fluorescence (UVF) soil analyses and evaluation for potential soil contamination within the Site.

2.0 GEOLOGY

2.1 Regional Geology

The Site is located within the Coastal Plain Physiographic Province of North Carolina. According to the 1985 State Geologic Map of North Carolina, the area is within the Middendorf Formation and is underlain by sand, sandstone, and mudstone.

2.2 Site Geology

Site geology was observed through the advancement of eight shallow soil borings (P79-B1 to P79-B8). The borings were advanced to an approximate depth of 10 feet below ground surface (bgs). Groundwater was not encountered during boring advancement. Figure 2 presents the boring locations and Site layout. Soils encountered in the borings consisted mostly of tan to brown medium-grained with some fine sand overlying tan and orange clayey sand. Staining and petroleum odors were not observed in the borings. Based on observations of topography of the Site vicinity, the groundwater flow direction is inferred to be generally toward the west. Boring logs are presented in **Appendix A**.

3.0 FIELD ACTIVITIES

3.1 Preliminary Activities

Prior to commencing field sampling activities at the Site, several tasks were accomplished in preparation for the subsurface investigation. A Health and Safety Plan (HASP) was created with the Site-specific health and safety information necessary for the field activities, including protocols for COVID-19. The North Carolina underground utility location service (North Carolina 811) was contacted on August 24, 2021, for the parcel.

Eastern Solutions, LLC of Charlotte, North Carolina (Eastern Solutions) was retained to perform vegetation clearing at the parcel to facilitate access for geophysical survey equipment and the direct-push drill rig. Pyramid Geophysical Services of Greensboro, North Carolina (Pyramid) was retained to conduct a geophysical investigation. Probe Utility Locating (PUL) was retained to perform utility locating activities at the Site. Innovative Environmental Technologies, Inc. (IET) of Concord, North Carolina was retained by Wood to

perform the direct push sampling for soil borings, and UVF instrumentation was rented from Red Lab, LLC (Red Lab) of Wilmington, North Carolina.

Boring locations were strategically placed within the parcel to maximize the opportunity to encounter potential contaminated soil and to evaluate soil where subsurface features were designed.

3.2 Site Reconnaissance and Vegetation Clearing

Wood personnel visited the parcel on June 8, 2021, and observed a dilapidated building with a suspected dispenser island located along the northern exterior of the building. At the time of the initial site reconnaissance, the parcel was observed to be overgrown with dense vegetation. A photographic log is included in **Appendix B**.

The vegetation clearing was conducted by Eastern Solutions personnel on August 4, 2021. Eastern Solutions used a forestry cutter to remove small diameter trees and brush from the front and sides of the dilapidated building. A brush hog was used to mow the tall grass on the northern portion of the parcel.

3.3 Geophysical Survey Results and Utility Locating

The geophysical survey was conducted by Pyramid personnel between August 10 and 12, 2021. Pyramid conducted a geophysical investigation using electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys along the front and sides of the dilapidated building as these areas were most likely to contain USTs. A total of four EM anomalies were identified, which were attributed to visible cultural features at the ground surface. The GPR survey confirmed the absence of buried structures in the areas of metallic interference. These areas were subsequently deemed to be associated with vehicles, a sign, reinforced concrete pipe, and the on-Site building. The geophysical survey did not identify USTs within the investigation area. The complete Pyramid geophysics report is included as **Appendix C**.

Utility locating was performed by PUL personnel on August 24, 2021. The utility locating effort identified a buried stormwater/drainage culvert on the western portion of the parcel and numerous buried telephone and communication lines located on the northern portion of the parcel between NC 211 Hwy and the suspected dispenser island. The stormwater

culvert traverses the western portion of the parcel from north to south, discharging to the west of the on-Site building. The telephone and communication lines are located parallel to NC 211 Hwy and traverse the northern portion of Parcel 79 from west to east.

3.4 Soil Sampling

On September 2, 2021, Wood and IET mobilized to the Site to advance eight shallow soil borings (P79-B1 to P79-B8). The borings were advanced via direct-push technology to an approximate depth of 10 feet bgs. Boring locations targeted potential environmental sources at the Site and future drainage features. Please note, due to the numerous buried telephone and communication lines between NC 211 Hwy and the suspected dispenser island, soil borings were not advanced in this area.

The purpose of soil sampling was to assess if a petroleum release had impacted the Site and if so, to estimate the volume of impacted soil that might require special handling during NCDOT construction activities. IET advanced a soil sampler to the target depth at each boring location using an AMS PowerProbe. To minimize the potential for cross-contamination between samples, a new polyvinyl chloride (PVC) sleeve (tube) was inserted into the sampler for each soil interval. Visual and olfactory observations relative to the soil cores were recorded by Wood personnel. The soil types encountered in the borings were recorded to prepare soil boring logs. Wood conducted field screening for volatile organic compounds (VOCs) of the soil borings with a photoionization detector (PID). The portion of each soil core with the highest PID reading was selected from the 0–5 foot interval and the 5-10 foot interval for analysis of total petroleum hydrocarbons (TPH), diesel range organics (DRO), gasoline range organics (GRO), benzene, toluene, ethylbenzene, and xylene (BTEX), total aromatics, and polycyclic aromatic hydrocarbons (PAH) by UVF. Neither groundwater nor bedrock were encountered in the borings. Sixteen soil samples were collected from the borings at the Site for on-Site UVF analysis.

4.0 SOIL SAMPLING RESULTS

Based on September 2, 2021, PID screening and UVF hydrocarbon analysis, evidence of petroleum hydrocarbon impacts was not identified. The NCDEQ Action Levels of 100

milligrams per kilogram (mg/kg) for DRO and 50 mg/kg for GRO were not exceeded in 16 samples collected from the eight borings advanced at the Site.

PID readings for the 16 soil samples ranged from not detected in boring P79-B2 to 0.5 parts per million (ppm) in sample P79-B1-0-2 collected from 0 to 2 feet bgs. The PID field screening results for samples selected for UVF analysis are summarized in **Table 1** and the full list of PID readings are provided on the boring logs in Appendix A.

Results from the on-Site UVF petroleum soil analyses are presented in **Table 2**, with instrument generated tables in **Appendix D**. Several categories of analyses were measured such as: DRO, GRO, TPH, PAHs, and total aromatics. **Figure 3** presents the GRO and DRO results for the September 2021 investigation.

No GRO or DRO detections in the 16 soil samples collected at the Site exceeded their respective NCDEQ Action Levels. The hydrocarbon results from the QED QROS Hydrocarbon Analyzer are provided in Appendix D.

5.0 CONCLUSIONS

Based on the Site observations and UVF analysis, petroleum-impacted soil contamination was not identified as defined by localized exceedances of the NCDEQ Action Levels of 50 mg/kg for GRO and 100 mg/kg for DRO.

The following bulleted summary is based upon Wood’s evaluation of field observations and on-Site quantitative analyses of samples collected from the Site on September 2, 2021.

- The Site is occupied by a vacant dilapidated building and one suspected dispenser island based on visual evidence (i.e., metal pipe located in concrete pad). No USTs were identified during the geophysical survey or field activities.
- Eight soil borings were advanced to roughly 10 ft bgs within the investigation area to collect soil samples for on-Site UVF analysis. Sixteen soil samples were collected for on-Site UVF analysis.

-
- UVF analysis of the 16 soil samples collected did not identify petroleum-impacted soil.

6.0 RECOMMENDATIONS

Based on these Phase II Investigation results, Wood recommends no further action.

TABLES

Table 1: Summary of PID Screening Results
R-5709, Parcel 79 - Robert L. Schloegl Property
Aberdeen, North Carolina
Wood Project: 20478R5709

Boring ID	Depth of Sample Interval	PID Reading
P79-B1	0-2	0.5
	4-6	0.0
P79-B2	0-2	0.0
	6-8	0.0
P79-B3	4-6	0.4
	8-10	0.3
P79-B4	2-4	0.1
	8-10	0.2
P79-B5	0-2	0.1
	4-6	0.2
P79-B6	0-2	0.0
	4-6	0.1
P79-B7	2-4	0.0
	6-8	0.1
P79-B8	0-2	0.2
	6-8	0.3

Notes:

1. Samples collected on 9/2/21
 2. Depths shown in feet below ground surface (bgs)
 3. PID = Photoionization Detector
 4. PID readings shown in parts per million (ppm)
- Prepared By/Date: AJF 9/8/21
Checked By/Date: DRH 9/17/21

**Table 2: UVF Hydrocarbon Soil Sampling Results
R-5709, Parcel 79 - Robert L. Schloegl Property
Aberdeen, North Carolina
Wood Project: 20478R5709**

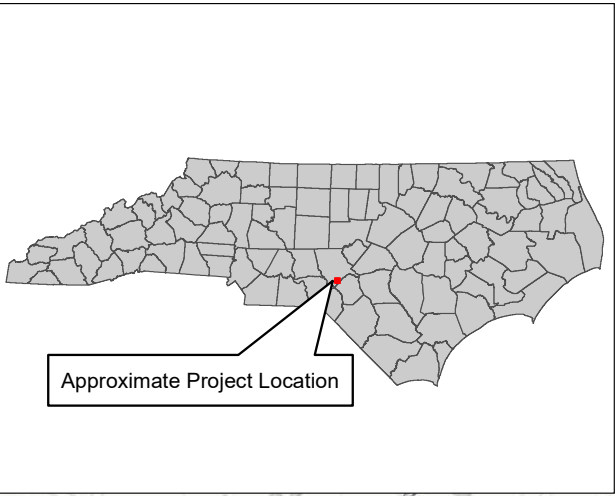
Sample ID Number	Sample Depth (ft. bgs)	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PAHs (mg/kg)
P79-B1-0-2	0-2	<0.22	<0.22	8.9	0.26
P79-B1-4-6	4-6	<0.25	<0.25	0.4	0.009
P79-B2-0-2	0-2	<0.5	<0.5	40.8	0.9
P79-B2-6-8	6-8	<0.4	<0.4	0.1	0.002
P79-B3-4-6	4-6	<0.3	<0.3	23.7	0.3
P79-B3-8-10	8-10	<0.4	<0.4	<0.18	<0.009
P79-B4-2-4	2-4	<0.3	<0.3	2.1	0.06
P79-B4-8-10	8-10	<0.3	<0.3	<0.15	<0.008
P79-B5-0-2	0-2	<0.5	<0.5	2.2	0.06
P79-B5-4-6	4-6	<0.17	<0.17	<0.07	<0.004
P79-B6-0-2	0-2	<0.22	29.4	4.2	0.11
P79-B6-4-6	4-6	<0.2	<0.2	8	0.027
P79-B7-2-4	2-4	<0.22	29.4	0.7	0.02
P79-B7-6-8	6-8	<0.22	<0.22	<0.09	0.001
P79-B8-0-2	0-2	<0.17	<0.17	4.2	0.11
P79-B8-6-8	6-8	<0.25	<0.25	0.1	0.001
NC State Action Level		N/A	50	100	N/A

Notes:

1. Samples collected on September 2, 2021
2. Depths shown in feet below ground surface (bgs)
3. Concentrations shown in milligrams per kilogram (mg/kg)
4. BTEX = Benzene, toluene, ethylbenzene, xylene
5. GRO = Gasoline Range Organics
6. DRO = Diesel Range Organics
7. PAHs = Polycyclic aromatic hydrocarbons
8. N/A = Not applicable
9. Bold values exceed respective NC State Action Level

Prepared By/Date: DRH 9/9/21
Checked By/Date: AJF 9/24/21

FIGURES



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Wood Environment & Infrastructure Solutions, Inc.
 2801 Yorkmont Road, Suite 100
 Charlotte, NC 28208
 (704) 357-8600

VICINITY MAP
 R-5709 - PARCEL 79
 9820 NC 211 HWY
 ABERDEEN, NORTH CAROLINA

PREPARED BY: LMM

DATE: 9/30/2021

CHECKED BY: HPC

Legend

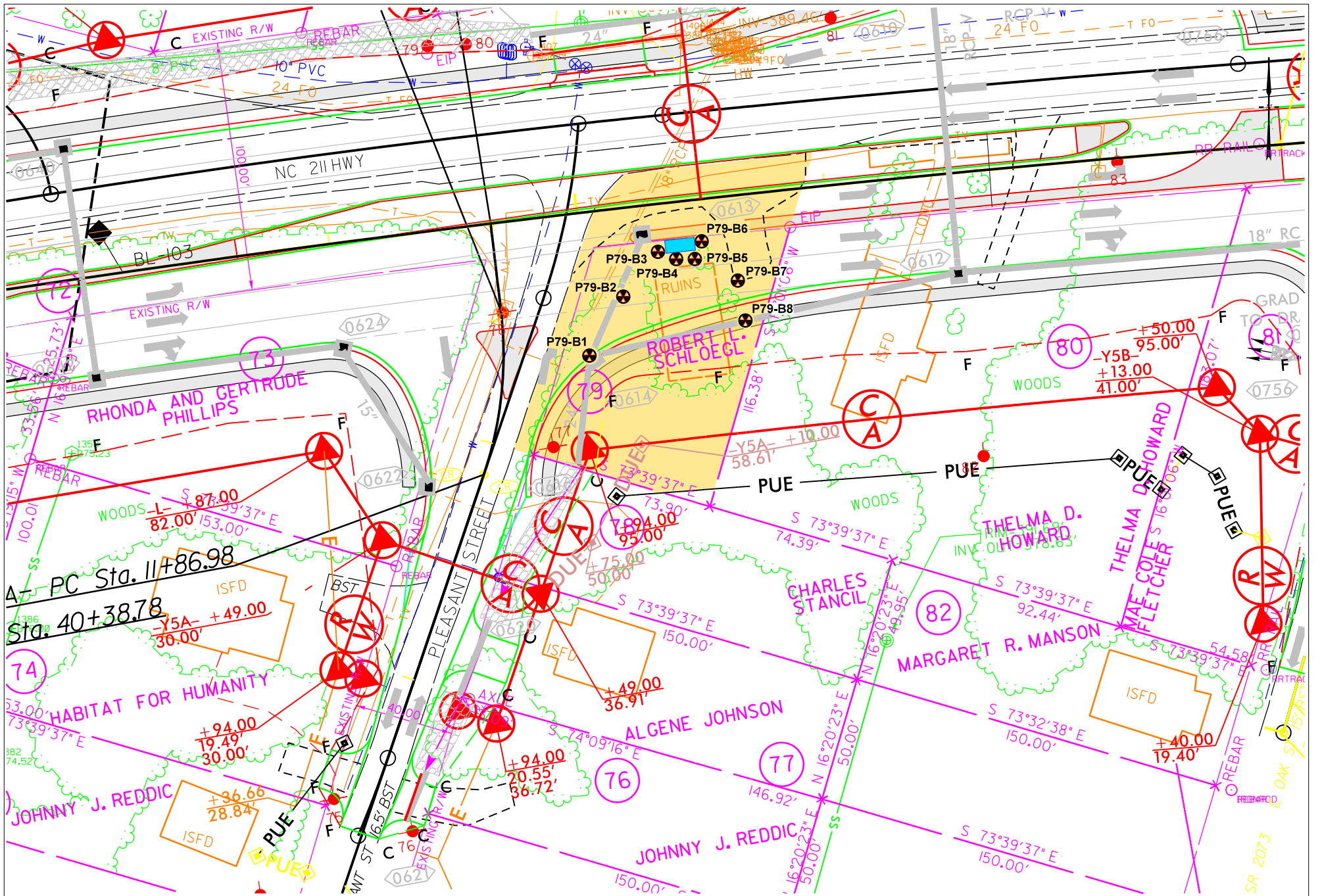
Site Boundary






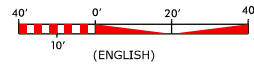
DATE: 9/30/2021

PROJECT NO: 20478R5709

FIGURE: 1



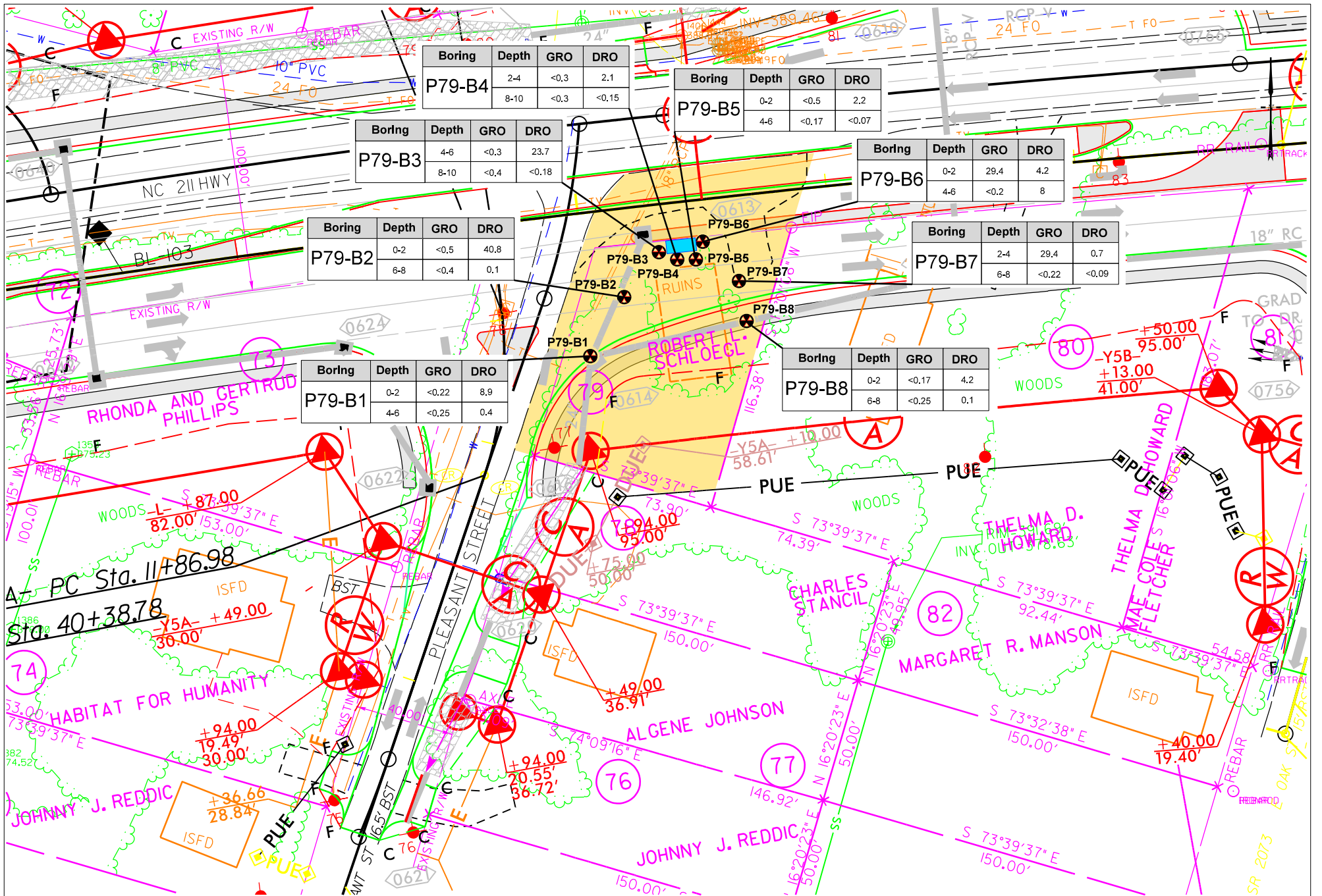
-  BORING LOCATION
-  AREA OF INVESTIGATION
-  SUSPECTED DISPENSER ISLAND



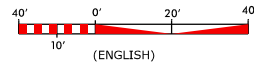
wood.

SITE MAP WITH BORING LOCATIONS
 R-5709 - PARCEL 79
 9820 NC 211 HWY
 ABERDEEN, NORTH CAROLINA

PREPARED BY: LMM	DATE: 9/30/21	CHECKED BY: AJF	DATE: 9/30/21	JOB NUMBER 20478R5709	FIGURE 2
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BORING LOCATION SUSPECTED DISPENSER ISLAND
 AREA OF INVESTIGATION
 DEPTHS SHOWN IN FEET BELOW GROUND SURFACE
 CONCENTRATIONS SHOWN IN MILLIGRAMS PER KILOGRAM (mg/kg)
 GRO=GASOLINE RANGE ORGANICS
 DRO=DIESEL RANGE ORGANICS
 GRO STATE ACTION LEVEL = 50 mg/kg
 DRO STATE ACTION LEVEL = 100 mg/kg
BOLD CONCENTRATION EXCEEDS RESPECTIVE STATE ACTION LEVEL



wood.

ANALYTICAL RESULTS MAP
 R-5709 - PARCEL 79
 9820 NC 211 HWY
 ABERDEEN, NORTH CAROLINA

PREPARED BY:	LMM	DATE:	10/1/21	CHECKED BY:	AJF	DATE:	10/1/21	JOB NUMBER	20478R5709	FIGURE	3
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APPENDIX A
BORING LOGS



SOIL BORING FIELD WORKSHEET

BORING #	P79-B1	BORING DEPTH (ft)	10	NUMBER OF PAGES	1
PROJECT #	20478R5709	PROJECT NAME	NCDOT R-5709		
DATE DRILLED	9/2/2021	WEATHER CONDITIONS	Partly Cloudy, 84°F		
DRILLING SUB-CONTRACTOR	IET	DRILL RIG	AMS PowerProbe		

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.5	Brown sand	P79-B1-0-2 selected for UVF analyses
2			
3	0.0	Gravel	
4			
5	0.0	Brown sand	P79-B1-4-6 selected for UVF analyses
6			
7	0.0	Tan/brown clayey sand	
8			
9	0.0	Tan clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

SOIL BORING FIELD WORKSHEET

BORING #	P79-B2	BORING DEPTH (ft)	10	NUMBER OF PAGES	1
PROJECT #	20478R5709	PROJECT NAME	NCDOT R-5709		
DATE DRILLED	9/2/2021	WEATHER CONDITIONS	Partly Cloudy, 84°F		
DRILLING SUB-CONTRACTOR	IET	DRILL RIG	AMS PowerProbe		

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Brown sand	P79-B2-0-2 selected for UVF analyses
2		Tan/brown sand	
3	0.0	Tan/gray sand	
4			
5	0.0		
6			
7	0.0	Tan/brown clayey sand	P79-B2-6-8 selected for UVF analyses
8			
9	0.0	Tan clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

SOIL BORING FIELD WORKSHEET

BORING #	P79-B3	BORING DEPTH (ft)	10	NUMBER OF PAGES	1
PROJECT #	20478R5709	PROJECT NAME	NCDOT R-5709		
DATE DRILLED	9/2/2021	WEATHER CONDITIONS	Partly Cloudy, 84°F		
DRILLING SUB-CONTRACTOR	IET	DRILL RIG	AMS PowerProbe		

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO	
1	0.0	Gravel/asphalt pieces Tan/brown sand		
2				
3		0.1		
4				
5	0.4	Brown clayey sand	P79-B3-4-6 selected for UVF analyses	
6				
7		Tan/brown clayey sand		
8	0.2			
9		0.3	Tan/orange clayey sand	P79-B3-8-10 selected for UVF analyses
10				
11		Boring terminated at 10 feet bgs		
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				

SOIL BORING FIELD WORKSHEET

BORING #	P79-B4	BORING DEPTH (ft)	10	NUMBER OF PAGES	1
PROJECT #	20478R5709	PROJECT NAME	NCDOT R-5709		
DATE DRILLED	9/2/2021	WEATHER CONDITIONS	Partly Cloudy, 84°F		
DRILLING SUB-CONTRACTOR	IET	DRILL RIG	AMS PowerProbe		

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Gravel/asphalt pieces Tan sand	
2			
3	0.1		P79-B4-2-4 selected for UVF analyses
4			
5	0.0	Brown clayey sand	
6			
7	0.2		
8		Tan/orange clayey sand	
9	0.2		P79-B4-8-10 selected for UVF analyses
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			



SOIL BORING FIELD WORKSHEET

BORING #	P79-B5	BORING DEPTH (ft)	10	NUMBER OF PAGES	1
PROJECT #	20478R5709	PROJECT NAME	NCDOT R-5709		
DATE DRILLED	9/2/2021	WEATHER CONDITIONS	Partly Cloudy, 84°F		
DRILLING SUB-CONTRACTOR	IET	DRILL RIG	AMS PowerProbe		

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.1	Gravel/asphalt pieces Tan sand	P79-B5-0-2 selected for UVF analyses
2			
3	0.0 Brown sand	
4			
5	0.2	Brown clayey sand	P79-B5-4-6 selected for UVF analyses
6			
7	0.0	Tan clayey sand	
8			
9	0.0	Tan/orange clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

SOIL BORING FIELD WORKSHEET

BORING #	P79-B6	BORING DEPTH (ft)	10	NUMBER OF PAGES	1
PROJECT #	20478R5709	PROJECT NAME	NCDOT R-5709		
DATE DRILLED	9/2/2021	WEATHER CONDITIONS	Partly Cloudy, 84°F		
DRILLING SUB-CONTRACTOR	IET	DRILL RIG	AMS PowerProbe		

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Gravel/asphalt pieces Tan/brown sand	P79-B6-0-2 selected for UVF analyses
2			
3	0.0	Tan sand	
4		Brown sand	
5	0.1		P79-B6-4-6 selected for UVF analyses
6			
7	0.0	Tan clayey sand	
8			
9	0.0	Tan/orange clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
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18			
19			
20			
21			

SOIL BORING FIELD WORKSHEET

BORING #	P79-B8	BORING DEPTH (ft)	10	NUMBER OF PAGES	1
PROJECT #	20478R5709	PROJECT NAME	NCDOT R-5709		
DATE DRILLED	9/2/2021	WEATHER CONDITIONS	Partly Cloudy, 84°F		
DRILLING SUB-CONTRACTOR	IET	DRILL RIG	AMS PowerProbe		

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.2	Gravel/asphalt pieces	P79-B8-0-2 selected for UVF analyses
2		Tan/brown sand	
3	0.1	Tan sand	
4		Brown clayey sand	
5	0.1		
6			
7	0.3	Tan clayey sand	P79-B8-6-8 selected for UVF analyses
8			
9	0.2	Tan/orange clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

APPENDIX B
PHOTOGRAPHIC LOG



Photograph 1:
Parcel 79 prior to
vegetation clearing,
facing south.



Photograph 2:
Vegetation clearing
around dilapidated
building at the parcel,
facing south.



Photograph 3:
Parcel 79 following the
completion of
vegetation clearing,
facing south.



Photograph 4:
Parcel 79 following the
completion of
vegetation clearing,
facing south.



Photograph 5:
View of numerous markings indicating underground utilities located between the suspected dispenser island (right side of photo) and NC 211 Hwy (left side of photo), facing east.



Photograph 6:
View of IET advancing direct push soil sampler, photograph taken on different parcel.



Photograph 7:
View of on-Site UVF
analysis setup,
photograph taken on
different parcel.

APPENDIX C
GEOPHYSICAL REPORT



PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2021-201)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION: PARCEL 79 NCDOT PROJECT R-5709 (50205.1.1)

9820 NC-211, ABERDEEN, NC

August 25, 2021

Report prepared for: Helen P. Corley, LG, RSM, BCES
Wood, PLC
2801 Yorkmont Road #100
Charlotte, NC 28208

Prepared by: _____

Eric C. Cross, P.G.
NC License #2181

Reviewed by: _____

Douglas A. Canavello, P.G.
NC License #1066

503 INDUSTRIAL AVENUE, GREENSBORO, NC 27406

P: 336.335.3174 F: 336.691.0648

C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 79 - 9820 NC-211
Aberdeen, Moore County, North Carolina

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- Figure 4 – Overlay of Metal Detection Results on NCDOT Engineering Plans

LIST OF ACRONYMS

CADD	Computer Assisted Drafting and Design
DF	Dual Frequency
EM.....	Electromagnetic
GPR.....	Ground Penetrating Radar
GPS	Global Positioning System
NCDOT.....	North Carolina Department of Transportation
ROW	Right-of-Way
UST	Underground Storage Tank

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental (Pyramid) conducted a geophysical investigation for Wood, PLC at Parcel 79, located at 9820 NC-211, in Aberdeen, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5709). The survey included all accessible portions of the survey area indicated to Pyramid by Wood, PLC. Conducted from August 10-12, 2021, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of four EM anomalies were identified. All of the EM anomalies were directly attributed to visible cultural features at the ground surface. GPR was performed around all sources of significant metallic interference to confirm that the interference did not obscure any significant structures such as USTs. Evidence of minor possible buried metallic debris was observed. No evidence of any significant buried structures such as USTs was observed. Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 79.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Wood, PLC at Parcel 79, located at 9820 NC-211, in Aberdeen, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5709). The survey included all accessible portions of the survey area indicated to Pyramid by Wood, PLC. Conducted from August 10-12, 2021, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site consisted of a vacant lot with a deteriorated structure surrounded by grass, gravel, and dirt surfaces. An aerial photograph showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61-MK2 (EM61) metal detector integrated with a Geode External GPS/GLONASS receiver. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. Smaller objects (1-foot or less in size) can be detected to a maximum depth of 4 to 5 feet. The EM61 data were digitally collected at approximately 0.8-foot intervals along north-south trending or east-west trending, generally parallel survey lines, spaced five feet apart. The data were downloaded to a

computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 15.0 software programs.

GPR data were acquired across select EM anomalies on August 12, 2021, using a Geophysical Survey Systems, Inc. (GSSI) SIR 4000 control unit coupled to a 350 MHz HS antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 6 feet, based on dielectric constants calculated by the SIR 4000 unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the DF unit for post-processing and figure generation.

Pyramid’s classifications of USTs for the purposes of this report are based directly on the geophysical UST ratings provided by the NCDOT. These ratings are as follows:

Geophysical Surveys for Underground Storage Tanks on NCDOT Projects			
High Confidence	Intermediate Confidence	Low Confidence	No Confidence
Known UST Active tank - spatial location, orientation, and approximate depth determined by geophysics.	Probable UST Sufficient geophysical data from both magnetic and radar surveys that is characteristic of a tank. Interpretation may be supported by physical evidence such as fill/vent pipe, metal cover plate, asphalt/concrete patch, etc.	Possible UST Sufficient geophysical data from either magnetic or radar surveys that is characteristic of a tank. Additional data is not sufficient enough to confirm or deny the presence of a UST.	Anomaly noted but not characteristic of a UST. Should be noted in the text and may be called out in the figures at the geophysicist’s discretion.

DISCUSSION OF RESULTS

Discussion of EM Results

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference in the figure. The

following table presents the list of EM anomalies and the cause of the metallic response, if known:

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	Sign	
2	Reinforced Concrete Pipe	
3	Vehicles	✓
4	Building	✓

All of the EM anomalies were directly attributed to visible cultural features at the ground surface, including a sign, a reinforced concrete pipe, vehicles, and the building. GPR was performed around the vehicles and adjacent to the building to confirm that the metallic interference did not obscure any significant structures such as USTs.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property as well as the transect images. A total of six formal GPR transects were performed at the site. GPR Transect 1 was performed adjacent to the vehicles and GPR Transects 2-6 were performed adjacent to the building. Evidence of possible minor buried metallic debris was observed in some of the GPR results. No evidence of significant buried structures such as USTs was observed.

Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 79. **Figure 4** provides an overlay of the metal detection results on the NCDOT engineering plans for reference.

SUMMARY & CONCLUSIONS

Pyramid’s evaluation of the EM61 and GPR data collected at Parcel 79 in Aberdeen, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.

- All of the EM anomalies were directly attributed to visible cultural features at the ground surface.
- GPR was performed around all sources of significant metallic interference to confirm that the interference did not obscure any significant structures such as USTs.
- Evidence of minor possible buried metallic debris was observed. No evidence of any significant buried structures such as USTs was observed.
- Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 79.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for Wood, PLC, in accordance with generally accepted guidelines for EM61 and GPR surveys. It is generally recognized that the results of the EM61 and GPR surveys are non-unique and may not represent actual subsurface conditions. The EM61 and GPR results obtained for this project have not conclusively determined the definitive presence or absence of metallic USTs, but the evidence collected is sufficient to result in the conclusions made in this report. Additionally, it should be understood that areas containing extensive vegetation, reinforced concrete, or other restrictions to the accessibility of the geophysical instruments could not be fully investigated.

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA



View of Survey Area (Facing Approximately South)



View of Survey Area (Facing Approximately East)



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GREENSBORO, NC 27406
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PROJECT
PARCEL 79
ABERDEEN, NORTH CAROLINA
NCDOT PROJECT R-5709

TITLE
PARCEL 79 -
GEOPHYSICAL SURVEY BOUNDARIES
AND SITE PHOTOGRAPHS

DATE
8/16/2021

PYRAMID PROJECT #:
2021-201

CLIENT
Wood, PLC

FIGURE 1

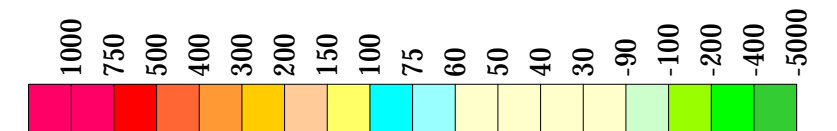
EM61 METAL DETECTION RESULTS



NO EVIDENCE OF METALLIC USTs WAS OBSERVED.

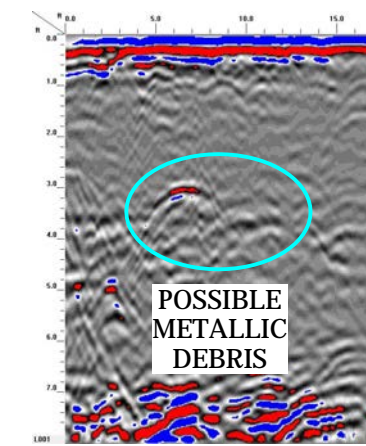
The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM data were collected on August 10, 2021, using a Geonics EM61-MK2 instrument. Verification GPR data were collected using a GSSI SIR 4000 instrument with a 350 MHz HS antenna on August 12, 2021.

EM61 Metal Detection Response (millivolts)

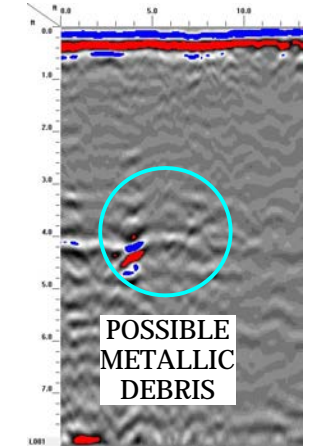


	503 INDUSTRIAL AVENUE GREENSBORO, NC 27406 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	PROJECT PARCEL 79 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709	TITLE PARCEL 79 - EM61 METAL DETECTION CONTOUR MAP	DATE	8/16/2021	CLIENT	Wood, PLC
				PYRAMID PROJECT #:	2021-201	FIGURE 2	

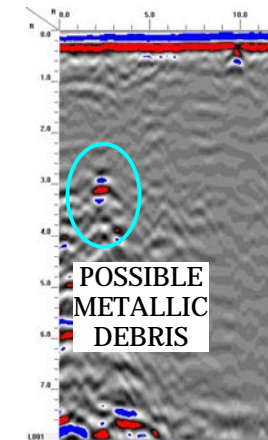
GPR TRANSECT LOCATIONS



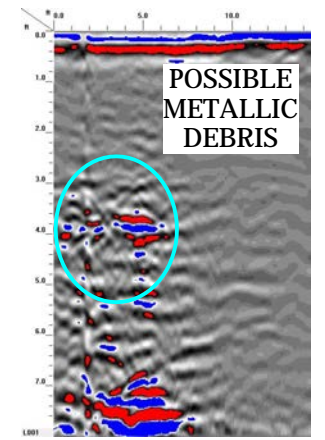
GPR TRANSECT 1 (T1)



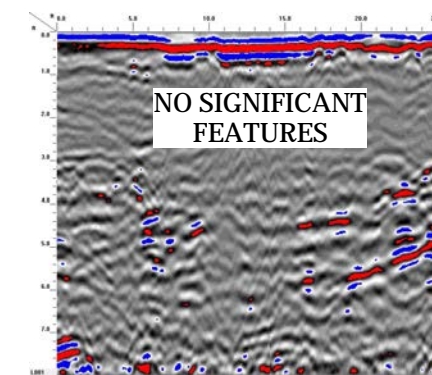
GPR TRANSECT 2 (T2)



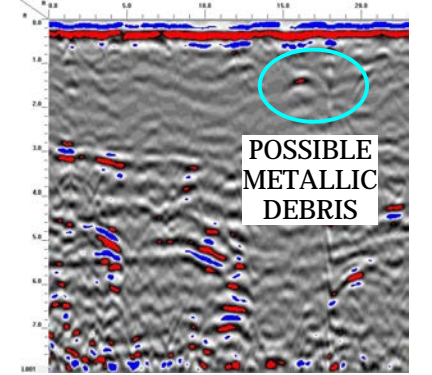
GPR TRANSECT 3 (T3)



GPR TRANSECT 4 (T4)



GPR TRANSECT 5 (T5)



GPR TRANSECT 6 (T6)



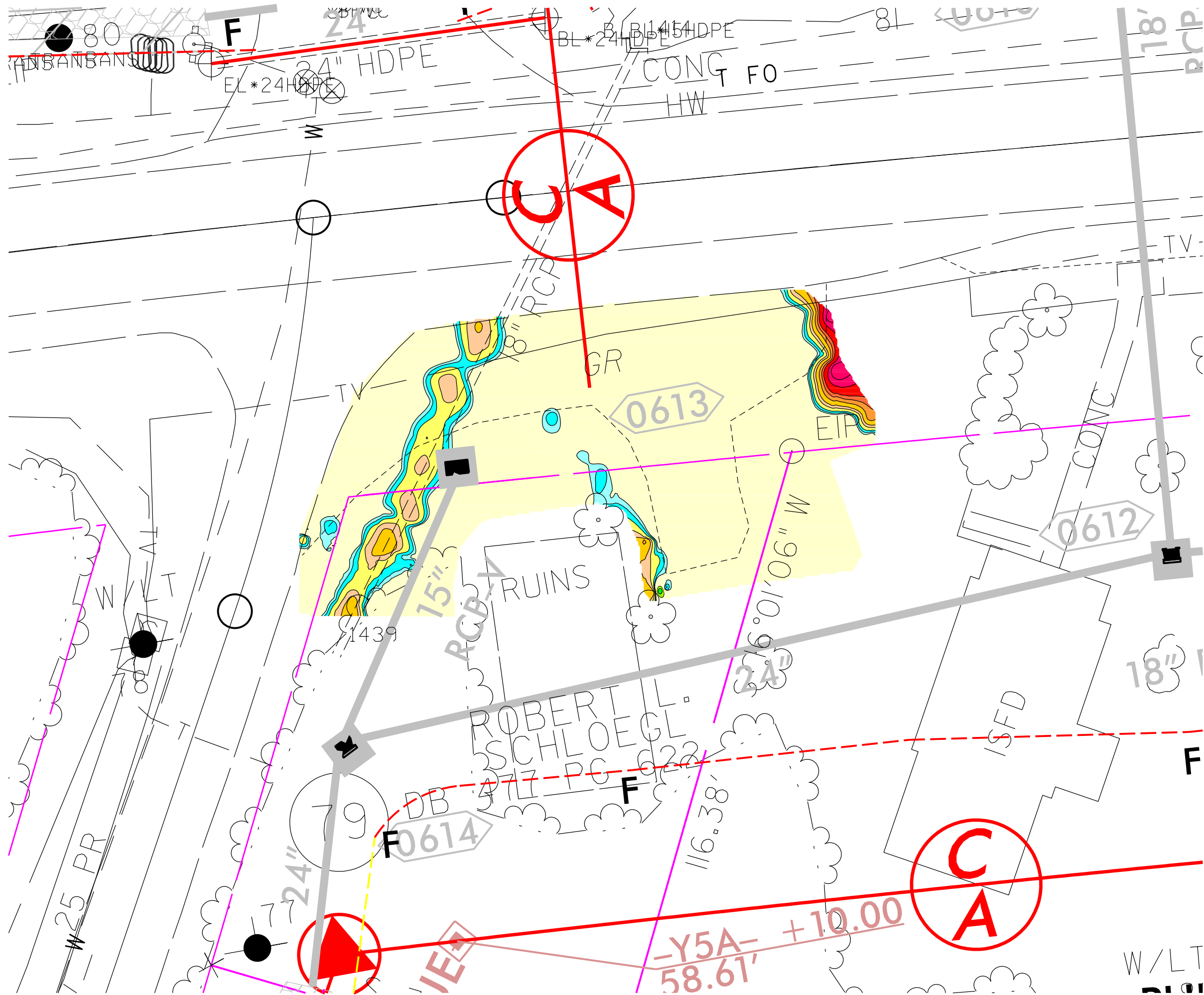
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PROJECT
PARCEL 79
ABERDEEN, NORTH CAROLINA
NCDOT PROJECT R-5709

TITLE
PARCEL 79 -
GPR TRANSECT LOCATIONS AND IMAGES

DATE
8/16/2021
PYRAMID PROJECT #:
2021-201

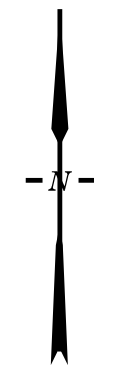
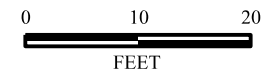
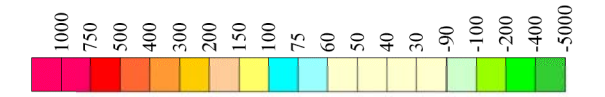
CLIENT
Wood, PLC
FIGURE 3



LEGEND

- EXISTING ROW
- EXISTING PROPERTY BOUNDARY
- PROPOSED ROW LINE
- TEMPORARY CONSTRUCTION EASEMENT
- PROPOSED PERMANENT DRAINAGE
- PROPOSED SS CUT LINE
- PROPOSED SS FILL LINE

MILLIVOLTS (mV)



TITLE OVERLAY OF METAL DETECTION RESULTS ON NCDOT ENGINEERING PLANS	
PROJECT PARCEL 79 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709	
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DATE: 08-18-2021	REVISION NO. 0
PYRAMID PROJECT NO. 2021-201	FIGURE NO. 4

APPENDIX D
UVF HYDROCARBON ANALYTICAL RESULTS

Hydrocarbon Analysis Results

Client: Wood
Address 2801 Yorkmont Road
 Charlotte NC, 28208

Samples taken Thursday, September 2, 2021
Samples extracted Thursday, September 2, 2021
Samples analysed Thursday, September 2, 2021



Contact: Helen Corley

Operator DRH

Project: P79

H09382

Matrix	Sample ID	Dilution used	BTEX	GRO	DRO	TPH	Total Aromatics	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
			C6-C9	C5-C10	C10-C35	C5-C35	C10-C35			C5:10	C10:C18	C18+	
Soil	P79-B1-0-2	9.0	<0.22	<0.22	8.9	8.9	4.9	0.26	0.005	0	66.4	33.6	V.Deg.PHC 60.8%,(FCM)
Soil	P79-B1-4-6	10.0	<0.25	<0.25	0.4	0.4	0.19	0.009	<0.003	0	77.4	22.6	V.Deg.PHC 76.4%,(FCM)
Soil	P79-B2-0-2	21.0	<0.5	<0.5	40.8	40.8	17.9	0.9	0.028	0	83.4	16.6	V.Deg.PHC 88.8%,(FCM)
Soil	P79-B2-6-8	16.0	<0.4	<0.4	0.1	0.1	0.05	0.002	<0.005	0	80.2	19.8	Residual HC
Soil	P79-B3-4-6	14.0	<0.3	<0.3	23.7	23.7	6	0.3	0.005	0	85.3	14.7	V.Deg.Light Fuel 93.9%,(FCM),(BO)
Soil	P79-B3-8-10	18.0	<0.4	<0.4	<0.18	<0.4	<0.009	<0.009	<0.005	0	0	100	Residual HC
Soil	P79-B4-2-4	15.0	<0.3	<0.3	2.1	2.1	1.3	0.06	0.001	0	87.3	12.7	V.Deg.Light Fuel 89.5%,(FCM),(BO)
Soil	P79-B4-8-10	15.0	<0.3	<0.3	<0.15	<0.3	<0.008	<0.008	<0.005	0	0	100	Residual HC
Soil	P79-B5-0-2	20.0	<0.5	<0.5	2.2	2.2	1.1	0.06	0.001	0	78.7	21.3	V.Deg.PHC 82.8%,(FCM)

Initial Calibrator QC check **OK**

Final FCM QC Check **OK** 100.0%

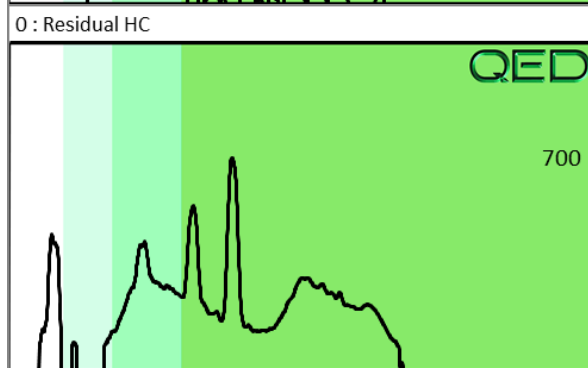
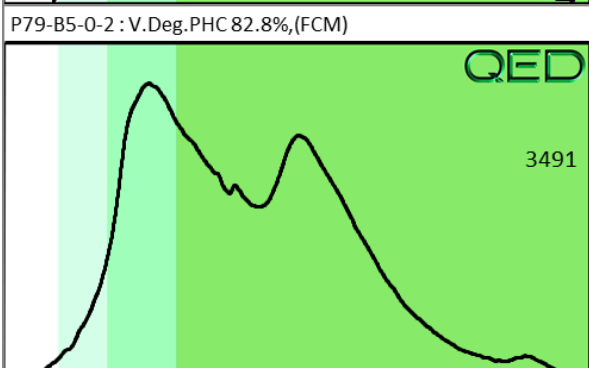
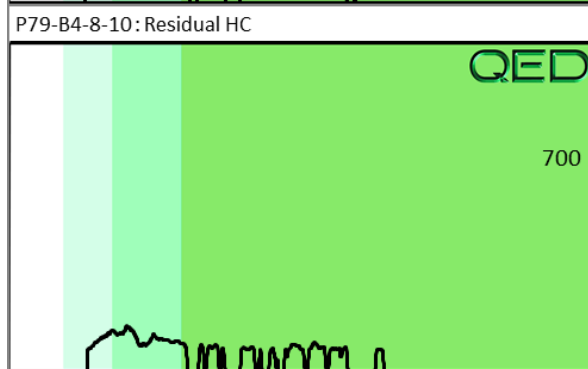
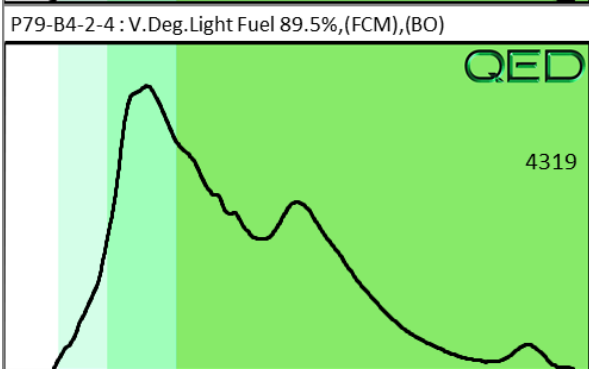
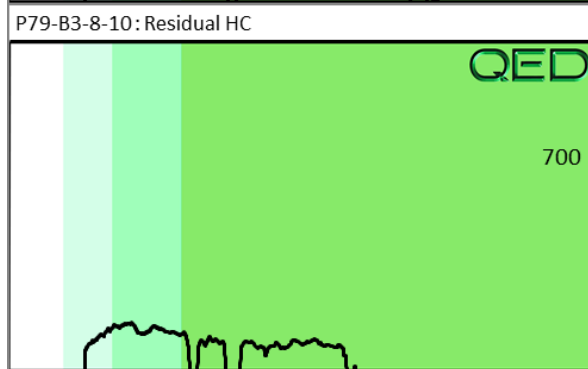
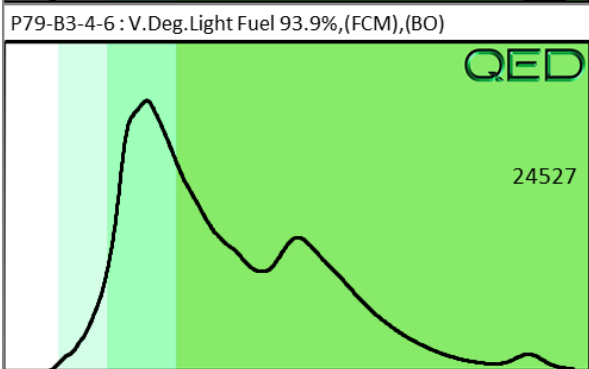
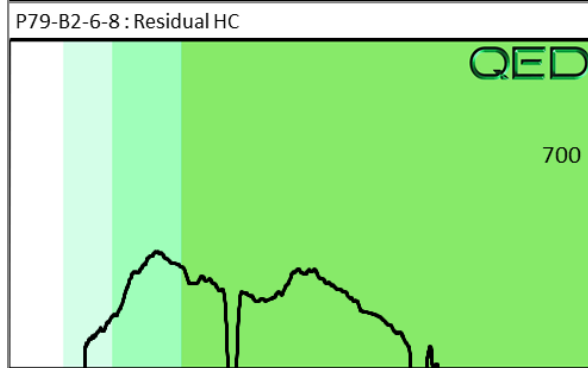
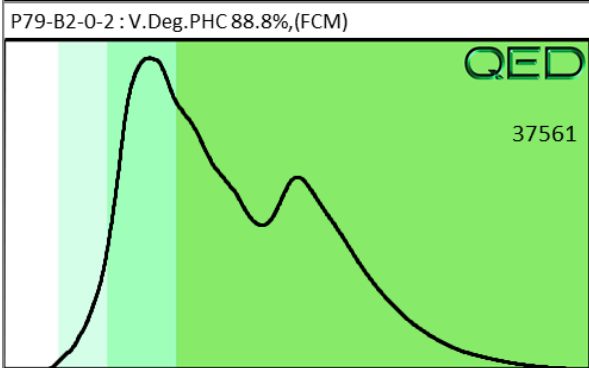
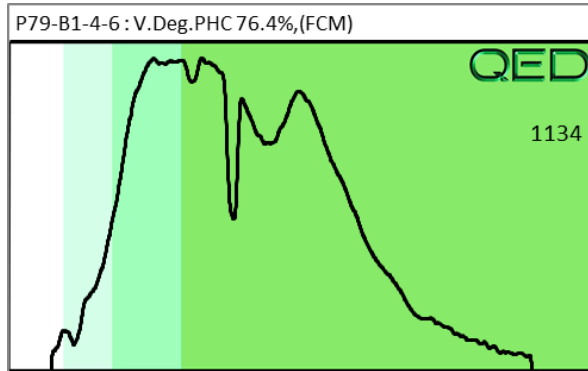
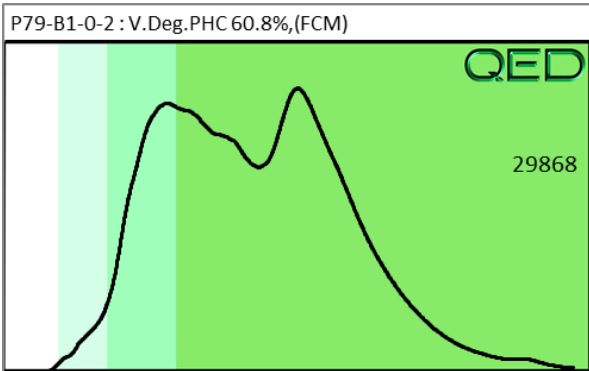
Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected
 HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected
 (B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background
 (TD) = Calibration outside limit

QED Hydrocarbon Fingerprints

Project: P79



Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Road
 Charlotte NC, 28208



Samples taken Thursday, September 2, 2021
Samples extracted Thursday, September 2, 2021
Samples analysed Thursday, September 2, 2021

Contact: Helen Corley

Operator DRH

Project: P79

H09382

Matrix	Sample ID	Dilution used	BTEX	GRO	DRO	TPH	Total Aromatics	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
			C6-C9	C5-C10	C10-C35	C5-C35	C10-C35				C5:10	C10:C18	
Soil	P79-B5-4-6	7.0	<0.17	<0.17	<0.07	<0.17	<0.004	<0.004	<0.002	0	100	0	Residual HC
Soil	P79-B6-0-2	9.0	<0.22	29.4	4.2	33.6	2	0.11	0.003	94.5	4.4	1.1	No Match found
Soil	P79-B6-4-6	8.0	<0.2	<0.2	8	8	0.5	0.027	<0.001	0	80	20	V.Deg.Light Fuel 90.8%,(FCM)
Soil	P79-B7-2-4	9.0	<0.22	29.4	0.7	30.18	0.3	0.02	<0.001	98.9	0.8	0.3	No Match found
Soil	P79-B7-6-8	9.0	<0.22	<0.22	<0.09	0.013	0.013	0.001	<0.003	0	34	66	PHC ND,(FCM)
Soil	P79-B8-0-2	7.0	<0.17	<0.17	4.2	4.2	2.1	0.11	0.003	0	76.9	23.1	V.Deg.PHC 73.7%,(FCM)
Soil	P79-B8-6-8	10.0	<0.25	<0.25	0.1	0.1	0.022	0.001	<0.001	0	100	0	Residual HC

Initial Calibrator QC check OK

Final FCM QC Check OK 100.6%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

QED Hydrocarbon Fingerprints

Project: P79

